

What is claimed is:

1           1.       A method for use in a wellbore, comprising:  
2                   causing creation of tunnels in surrounding formation of a well interval;  
3                   applying treatment fluid to the tunnels; and  
4                   creating a local transient underbalance condition in the well interval after  
5 creation of the tunnels in the formation and application of the treatment fluids.

1           2.       The method of claim 1, wherein creating the local transient underbalance  
2 condition causes a surge of fluid flow out of the tunnels to clean the tunnels.

1           3.       The method of claim 1, wherein causing the creation of tunnels comprises  
2 firing a perforating gun.

1           4.       The method of claim 1, wherein applying the treatment fluid comprises  
2 applying a matrix treatment fluid.

1           5.       The method of claim 1, wherein applying the treatment fluid comprises  
2 applying at least one of acid, chelant, solvent, surfactant, brine, oil, and enzyme.

1           6.       The method of claim 1, wherein creating the local transient underbalance  
2 condition comprises:  
3                   providing a surge chamber; and  
4                   opening at least one port to the surge chamber to create a fluid surge into  
5 the surge chamber.

1           7.       The method of claim 1, wherein creation of the local transient  
2 underbalance causes performance of a surge operation to clean the tunnels, the method  
3 further comprising performing a fracture operation after the surge operation.

1           8.     The method of claim 7, further comprising performing a gravel pack  
2 operation after the fracture operation.

1           9.     The method of claim 1, wherein creating the local transient underbalance  
2 causes performance of a surge operation to clean the tunnels, the method further  
3 comprising performing a gravel pack operation.

1           10.    The method of claim 1, wherein applying the treatment fluid comprises  
2 activating an applicator tool to apply the treatment fluid.

1           11.    The method of claim 10, wherein activating the applicator tool comprises  
2 opening at least one port of the applicator tool.

1           12.    The method of claim 1, wherein applying the treatment fluid comprises  
2 applying the treatment fluid in presence of an overbalance condition.

1           13.    The method of claim 12, further comprising activating a perforating gun to  
2 create the overbalance condition, the overbalance condition comprising a transient  
3 overbalance condition.

1           14.    The method of claim 13, wherein activating the perforating gun comprises  
2 activating a tubing conveyed perforating gun.

1           15.    The method of claim 13, wherein applying the treatment fluid comprises  
2 applying an acid to flow into the tunnels due to the presence of the overbalance condition.

1           16.    The method of claim 15, wherein applying the acid comprises flowing a  
2 substantially equal amount of acid into each of the tunnels.

1           17.    The method of claim 1, wherein applying the treatment fluid comprises  
2 applying a brine to reduce surface tension within the tunnels.

- 1           18.     The method of claim 1, wherein applying the treatment fluid comprises  
2     applying a surfactant to enhance the transport of debris out of the tunnels.
- 1           19.     The method of claim 1, wherein applying the treatment fluid comprises  
2     applying a fluid to enhance cleanup of the tunnels.
- 1           20.     The method of claim 1, further comprising applying a sequence of  
2     pressure conditions in the wellbore interval, the sequence of pressure conditions  
3     comprising the transient underbalance condition and other pressure conditions.
- 1           21.     The method of claim 20, wherein applying the other pressure conditions  
2     comprises applying at least one of an underbalance condition, overbalance condition, and  
3     balanced condition.
- 1           22.     A tool string for use in a well having a formation with tunnels formed  
2     therein, comprising:  
3                 an applicator device adapted to apply treatment fluid into the tunnels; and  
4                 a surge device adapted to create a local transient underbalance condition to  
5     cause flow of fluid from the tunnels.
- 1           23.     The tool string of claim 22, further comprising a perforating gun.
- 1           24.     The tool string of claim 22, wherein the applicator device includes one or  
2     more ports activatable to enable the application of the treatment fluid.
- 1           25.     The tool string of claim 24, further comprising another device adapted to  
2     create an overbalance condition to enable the application of the treatment fluid into the  
3     tunnels.
- 1           26.     The tool string of claim 25, wherein the another device comprises a  
2     perforating gun.

1           27.    The tool string of claim 22, wherein the surge device comprises:  
2                   a low pressure chamber; and  
3                   at least one port selectively openable to enable communication between  
4 the chamber and a wellbore region,  
5                   the at least one port when opened creating a fluid surge into the chamber  
6 to provide the local transient underbalance condition.

1           28.    The tool string of claim 27, wherein the port comprises a valve.

1           29.    The tool string of claim 27, wherein the port comprises a fluid blocking  
2 element adapted to be broken by an explosive force.

1           30.    The tool string of claim 29, further comprising an explosive element  
2 positioned proximal the fluid blocking element.

1           31.    The tool string of claim 22, further comprising a plurality of sections, each  
2 section comprising an applicator device to apply a treatment fluid and a surge device.

1           32.    The tool string of claim 31, wherein the plurality of sections are adapted to  
2 be activated at different times.

1           33.    The tool string of claim 22, further comprising a plurality of sections, each  
2 section comprising a combination of one or more of the following: perforating gun,  
3 applicator device to apply a treatment fluid, and a surge device.

1           34.    The tool string of claim 22, further comprising an assembly adapted to  
2 perform a fracture operation after cleanup of the tunnels caused by flow of fluids from  
3 the tunnel in the presence of the local transient underbalance condition.

1           35.    A method comprising:  
2                   storing information relating to surge characteristics for different types of  
3 wellbores;  
4                   for a target wellbore, determining its type;  
5                   determining one or more treatment fluids selected for use in treatment of  
6 perforation tunnels; and  
7                   selecting surge characteristics based on selected one or more treatment  
8 fluids and the determined type of wellbore using the stored information.

1           36.    The method of claim 35, wherein selecting the surge characteristics  
2 comprises selecting a time delay between a perforating operation and a surge operation.

1           37.    The method of claim 35, wherein selecting the surge characteristics  
2 comprises selecting a volume of a chamber containing a low pressure to generate the  
3 surge operation.